ABSTRACT

A method and apparatus are provided for identifying differences between a stored pattern and a matching image subset, where variations in pattern position, orientation, and size do not give rise to false differences. The invention is also a system for analyzing an object image with respect to a model pattern so as to detect flaws in the object image. The system includes extracting pattern features from the model pattern; generating a vector-valued function using the pattern features to provide a pattern field; extracting image features from the object image; evaluating each image feature, using the pattern field and an n-dimensional transformation that associates image features with pattern features, so as to determine at least one associated feature characteristic; and using at least one feature characteristic to identify at least one flaw in the object image. The invention can find at least two distinct kinds of flaws: missing features, and extra features. The invention provides pattern inspection that is faster and more accurate than any known prior art method by using a stored pattern that represents an ideal example of the object to be found and inspected, and that can be translated, rotated, and scaled to arbitrary precision much faster than digital image re-sampling, and without pixel grid quantization errors. Furthermore, since the invention does not use digital image re-sampling, there are no pixel quantization errors to cause false differences between the pattern and image that can limit inspection performance.